

We claim:

- 1 1. A method for rendering a region of a composite glyph, comprising:
  - 2 defining a composite glyph by a set of elements;
  - 3 generating a set of two-dimensional distance fields using the set of elements,
  - 4 a composition of the set of two-dimensional distance fields representing the
  - 5 composite glyph; and
  - 6 rendering a region of the composite glyph using the set of two-dimensional
  - 7 distance fields, the rendering further comprising:
    - 8 determining, for each component of each pixel in the region, an
    - 9 antialiased intensity of the component of the pixel, the determining further
    - 10 comprising:
      - 11 associating, for each distance field in the set of two-
      - 12 dimensional distance fields, a corresponding set of sample points with
      - 13 the component of the pixel;
      - 14 determining, for each distance field in the set of two-
      - 15 dimensional distance fields, a corresponding distance using the
      - 16 corresponding set of sample points;
      - 17 combining the corresponding distances to determine a
      - 18 combined distance; and
      - 19 mapping the combined distance to the antialiased intensity of
      - 20 the component of the pixel.

1 2. The method of claim 1 wherein a particular element in the set of elements is a  
2 stroke.

1 3. The method of claim 1 wherein a particular element in the set of elements is an  
2 outline.

1 4. The method of claim 1 wherein a particular element in the set of elements is a  
2 radical.

1 5. The method of claim 1 wherein a particular element in the set of elements is a  
2 stroked radical.

1 6. The method of claim 1 wherein a particular element in the set of elements is a  
2 two-dimensional shape descriptor.

1 7. The method of claim 1 wherein a particular element in the set of elements is a  
2 one-dimensional shape descriptor.

1 8. The method of claim 1 wherein a particular element in the set of elements is a  
2 path.

1 9. The method of claim 1 wherein a particular element in the set of elements is a  
2 distance field.

1 10. The method of claim 1 wherein a particular element in the set of elements is a  
2 distance map.

1 11. The method of claim 1 wherein a particular element in the set of elements is an  
2 adaptively sampled distance field.

1 12. The method of claim 1 wherein a particular element in the set of elements is a  
2 procedure.

1 13. The method of claim 1 wherein a particular element in the set of elements is a  
2 distance function.

1 14. The method of claim 1 wherein a particular element in the set of elements is an  
2 implicit blend of a first shape descriptor and a second shape descriptor.

1 15. The method of claim 1 wherein a particular element in the set of elements is a  
2 skeletal descriptor with a corresponding offset descriptor.

1 16. The method of claim 1 wherein a particular element in the set of elements is  
2 drawn by a user.

1 17. The method of claim 1 wherein the defining is performed automatically by a  
2 procedure.

1 18. The method of claim 1 wherein the defining is performed by a user.

1 19. The method of claim 1 wherein the defining is performed semi-automatically  
2 by a procedure and a user.

- 1    20. The method of claim 1 wherein the defining further comprises:  
2        determining a shape descriptor for a particular element in the set of  
3    elements; and  
4        determining a distance function for the shape descriptor to define the  
5    particular element.
- 1    21. The method of claim 1 wherein the defining determines the set of elements  
2    from a distance field of a shape descriptor for the composite glyph.
- 1    22. The method of claim 1 wherein a particular two-dimensional distance field in  
2    the set of two-dimensional distance fields is an adaptively sampled distance field.
- 1    23. The method of claim 1 wherein a particular two-dimensional distance field in  
2    the set of two-dimensional distance fields comprises a set of distances stored in a  
3    memory.
- 1    24. The method of claim 1 wherein a particular two-dimensional distance field in  
2    the set of two-dimensional distance fields is represented by a procedure.
- 1    25. The method of claim 1 wherein the combining performs a maximum of the  
2    corresponding distances to determine the combined distance.
- 1    26. The method of claim 1 wherein the combining performs an arithmetic average  
2    of the corresponding distances to determine the combined distance.
- 1    27. The method of claim 1 wherein the combining performs a union of the  
2    corresponding distances to determine the combined distance.

1 28. The method of claim 1 wherein the combining performs an intersection of the  
2 corresponding distances to determine the combined distance.

1 29. The method of claim 1 wherein the combining performs a difference of the  
2 corresponding distances to determine the combined distance.

1 30. The method of claim 1 wherein the combining performs an implicit blend of  
2 the corresponding distances to determine the combined distance.

1 31. The method of claim 1 wherein the combining performs an arithmetic  
2 operation on the corresponding distances to determine the combined distance.

1 32. The method of claim 1 wherein the combining performs a conditional operation  
2 on the corresponding distances to determine the combined distance.

1 33. The method of claim 1 wherein the combining uses a procedure to determine  
2 the combined distance.

1 34. The method of claim 1 wherein the combining uses a table to determine the  
2 combined distance.

1 35. A method for rendering a region of a composite glyph, comprising:  
2 defining a composite glyph by a set of elements;  
3 generating a set of two-dimensional distance fields using the set of elements,  
4 a composition of the set of two-dimensional distance fields representing the  
5 composite glyph; and  
6 rendering a region of the composite glyph using the set of two-dimensional  
7 distance fields.

1 36. The method of claim 35 wherein the rendering determines, for each component  
2 of each pixel in the region, an antialiased intensity of the component of the pixel.

1 37. The method of claim 36 wherein the determining of the antialiased intensity of  
2 the component of the pixel further comprises:

3 associating, for each distance field in the set of two-dimensional distance  
4 fields, a corresponding set of sample points with the component of the pixel;

5 determining, for each distance field in the set of two-dimensional distance  
6 fields, a corresponding distance using the corresponding set of sample points;

7 combining the corresponding distances to determine a combined distance;

8 and

9 mapping the combined distance to the antialiased intensity of the component  
10 of the pixel.

1 38. The method of claim 35 wherein a particular element in the set of elements is a  
2 stroke.

1 39. The method of claim 35 wherein a particular element in the set of elements is  
2 an outline.

1 40. The method of claim 35 wherein a particular element in the set of elements is a  
2 radical.

1 41. The method of claim 35 wherein a particular element in the set of elements is a  
2 stroked radical.

1 42. The method of claim 35 wherein a particular element in the set of elements is a  
2 two-dimensional shape descriptor.

1 43. The method of claim 35 wherein a particular element in the set of elements is a  
2 one-dimensional shape descriptor.

1 44. The method of claim 35 wherein a particular element in the set of elements is a  
2 path.

1 45. The method of claim 35 wherein a particular element in the set of elements is a  
2 distance field.

1 46. The method of claim 35 wherein a particular element in the set of elements is a  
2 distance map.

1 47. The method of claim 35 wherein a particular element in the set of elements is  
2 an adaptively sampled distance field.

1 48. The method of claim 35 wherein a particular element in the set of elements is a  
2 procedure.

1 49. The method of claim 35 wherein a particular element in the set of elements is a  
2 distance function.

1 50. The method of claim 35 wherein a particular element in the set of elements is  
2 an implicit blend of a first shape descriptor and a second shape descriptor.

1 51. The method of claim 35 wherein a particular element in the set of elements is a  
2 skeletal descriptor with a corresponding offset descriptor.

1 52. The method of claim 35 wherein a particular element in the set of elements is  
2 drawn by a user.

1 53. The method of claim 35 wherein the defining is performed automatically by a  
2 procedure.

1 54. The method of claim 35 wherein the defining is performed by a user.

1 55. The method of claim 35 wherein the defining is performed semi-automatically  
2 by a procedure and a user.

1 56. The method of claim 35 wherein the defining further comprises:  
2 determining a shape descriptor for a particular element in the set of  
3 elements; and  
4 determining a distance function for the shape descriptor to define the  
5 particular element.



1 57. The method of claim 35 wherein the defining determines the set of elements  
2 from a distance field of a shape descriptor for the composite glyph.

1 58. The method of claim 35 wherein a particular two-dimensional distance field in  
2 the set of two-dimensional distance fields is an adaptively sampled distance field.

1 59. The method of claim 35 wherein a particular two-dimensional distance field in  
2 the set of two-dimensional distance fields comprises a set of distances stored in a  
3 memory.

1 60. The method of claim 35 wherein a particular two-dimensional distance field in  
2 the set of two-dimensional distance fields is represented by a procedure.

1 61. The method of claim 37 wherein the combining performs a maximum of the  
2 corresponding distances to determine the combined distance.

1 62. The method of claim 37 wherein the combining performs an arithmetic average  
2 of the corresponding distances to determine the combined distance.

1 63. The method of claim 37 wherein the combining performs a union of the  
2 corresponding distances to determine the combined distance.

1 64. The method of claim 37 wherein the combining performs an intersection of the  
2 corresponding distances to determine the combined distance.

1 65. The method of claim 37 wherein the combining performs a difference of the  
2 corresponding distances to determine the combined distance.

1 66. The method of claim 37 wherein the combining performs an implicit blend of  
2 the corresponding distances to determine the combined distance.

1 67. The method of claim 37 wherein the combining performs an arithmetic  
2 operation on the corresponding distances to determine the combined distance.

1 68. The method of claim 37 wherein the combining performs a conditional  
2 operation on the corresponding distances to determine the combined distance.

1 69. The method of claim 37 wherein the combining uses a procedure to determine  
2 the combined distance.

1 70. The method of claim 37 wherein the combining uses a table to determine the  
2 combined distance.